

coefficient calculation circuit 27 calculates a temporary weighting coefficient of each block included in each group shown in the grouping information (by DC component) in accordance with the information specified in the graph of FIG. 3, based on the grouping information (by DC component) supplied from the DC-component-based block grouping section 26. Then, the weighting coefficient calculation circuit 27 obtains a mean value of the calculated weighting coefficients of the blocks included in the group, and sets the mean value as a weighting coefficient of the blocks included in the group shown in the grouping information (by DC component). As shown in FIG. 3, the larger weighting coefficient is given to the more centered positioned blocks. This is because the more centered position image portions may possibly be important to the rest of image portions.

The quantization step width calculation circuit 28 calculates the quantization step width in accordance with the amount of storage in the transmission buffer, using functions $f(x)$ shown in FIG. 4. After this, the quantization step width calculation circuit 28 divides the quantization step width of each block by the weighting coefficient of the block which is sent from the weighting coefficient calculation circuit 27, sets a resultant division as a quantization step width of the block, and sends the set quantization step width to the quantization circuit 16.

Operations of the image encoder 10 will now be explained, mainly focusing on the weighting section 20.

FIGS. 6A and 6B are diagrams each showing an example of an input image showing the situation wherein a man and a woman are in front of a camera of a TV conference system or TV telephone system. An input image 90a shown in FIG. 6A includes a woman's image 91a, a man's image 92a and a background image 93a of a direction pointer. Specifically, the image 90a shows the view wherein the woman speaks up in front of the camera and the man stays just beside her. An input image 90b shown in FIG. 6B includes a woman's image 91b, a man's image 92b and a background image 93b of a direction pointer. Specifically, the image 90b shows the view wherein the woman and

man has moved to one side so that the man stays just in front of the camera, after the view of FIG. 6A is displayed for a predetermined period of time.

Of operations for receiving the input image 90a of FIG. 6A and the input image 90b of FIG. 6B, the operations carried out by each circuit or section, except the weighting section 20, inside the image encoder 10 are the same as those described above. Hence, the operations of the weighting section 20 will mainly be explained.

In the state where the view of FIG. 6A is continuously displayed for a predetermined period, if the image encoder 10 receives the input image 90a shown in FIG. 6A, the frame divide circuit 11 divides the input image 90a into an $(N \times M)$ number of blocks each having an $(n \times n)$ number of pixels, writes the $(N \times M)$ number of blocks into the frame memory 12, and inputs them to the motion prediction circuit 13. The motion prediction circuit 13 compares each block (target block) of the input image 90a input from the frame divide circuit 11 with a block of the previously-input frame input from the frame memory 12, which is in the same position as the position of the target block, and also with its neighboring blocks. The motion prediction circuit 13 finds out a block having the smallest difference from the target block. The motion prediction circuit 13 calculates a movement direction and amount of the found block with respect to the target block, sets the movement as a motion vector of the target block, and writes a value of the motion vector into the motion-vector-value memory 21. In this case, the view shown in FIG. 6A is continuously displayed for a predetermined period, the movement amount of each block included in the image is nearly zero. In addition, the value of each motion vector which the motion prediction circuit 13 writes into the motion-vector-value memory 21 is substantially zero.

The motion-vector-based block grouping section 22 can not arrange the blocks into groups based on motion vector, as a result that a process of grouping blocks included in the input image 90a is performed based on the value of each motion vector written into the motion-vector-value memory 21. Hence, the motion-vector-based block grouping

section 22 supplies the weighting coefficient calculation circuit 27 with information representing that it can not arrange the blocks into groups.

The interframe prediction circuit 14 detects the position of the found block in the previously-input frame with respect to each target block of the input image 90a, based on 5 the motion vector, and calculates the differential data between the found block and the target block. The orthogonal transformation circuit 15 performs discrete cosine transformation so as to transform the differential data generated by the interframe prediction circuit 14 for each block included in the input image 90a, sends the transformed data to the quantization circuit 16, and writes DC of the brightness and color 10 information of each block into the DC component memory 25.

The DC-component-based block grouping section 26 arranges the blocks of the input image frame into groups, so that blocks having the similar color and brightness belong to the same group, based on values of the DC components of the brightness and color information stored in the DC component memory 25. The DC-component-based 15 block grouping section 26 then supplies the weighting coefficient calculation circuit 27 with the grouping information (by DC component) representing that the blocks of the image respectively belong to groups. In this case, for example, blocks corresponding to a portion of the face of the woman's image 91a constitutes one group. Similarly, a portion of the hair of the woman's image 91a, a portion of the cloth thereof, a portion of 20 the face of the man's image 92a, a portion of the hair of the man's image 92a and a portion of the hair thereof are each composed of a single group of blocks.

Since the grouping information (by motion vector) sent from the motion-vector-based block grouping section 22 represents that the grouping can not be achieved based on the motion vector, the weighting coefficient calculation circuit 27 calculates a 25 weighting coefficient of each block included in the input image 90a, based on the grouping information (by DC component) sent from the DC-component-based block grouping section 26. That is, the weighting coefficient calculation circuit 27 calculates